

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2016/2017

PEM0044 – ESSENTIAL MATHEMATICS

(All sections / Groups)

26 MAY 2017
9.00 a.m. - 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **FOUR (4)** printed pages with 4 questions only, excluding the cover page.
2. Answer all **FOUR (4)** questions.
3. Write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.
4. The formula sheet is attached at the end of this question paper.

Question 1 (30 Marks)

- (a) Perform the indicated operation and simplify the answer.

$$\frac{m}{m-4} + \frac{2m-1}{4-m}$$

[8 marks]

- (b) Rationalize the denominator.

$$\frac{1}{\sqrt{5} + \sqrt{3}}$$

[6 marks]

- (c) Solve the following inequality.

$$2(4+3x) \geq 10+4(x+1)$$

[5 marks]

- (d) Find an equation of the straight line that passes through point (1, -5) and is perpendicular to the line $2y - 4 = x$. Next, sketch the graph of the new equation.

[11 marks]

Question 2 (25 Marks)

- (a) Given

$$A = \begin{bmatrix} 3 & 4 \\ -1 & 2 \end{bmatrix} \text{ and } B = \begin{bmatrix} 3 & 2 \\ -1 & 2 \end{bmatrix}.$$

Find the matrix X satisfying the matrix equation $2X + B = 3A$.

[7 marks]

- (b) Solve the equation using the inverse of the coefficient matrix:

$$4x + y - 4z = 17$$

$$2x + y - z = 12$$

$$-2x - 4y + 5z = 17$$

(Note : No decimal is allowed in the calculation as well as in the final answer).

[18 marks]

Continued...

Question 3 (20 Marks)

- (a) Given the fourth term of an arithmetic progression is 56 and its tenth term is 140.
- (i) Find the common difference. [4 marks]
 - (ii) Find the first term. [3 marks]
 - (iii) Find the 8th term. [3 marks]
 - (iv) Find the sum of the first 16 terms. [4 marks]
- (b) Given the geometric progression: 12, 24, 48, 96, ...
- (i) Find the first term and the common ratio. [3 marks]
 - (ii) Find the 12th term. [3 marks]

Question 4 (25 Marks)

- (a) Find the derivatives of the following functions:
- (i) Find $\frac{dy}{dx}$ if $y = 1 - x^3 e^{-9x}$ [5 marks]
 - (ii) Find $f'(x)$ if $f(x) = 6^{\sqrt{x}}$ [5 marks]
 - (iii) Find $f'(x)$ if $f(x) = 2xe^{5-2x}$ [4 marks]

Continued...

(b) Evaluate each of the following integrals:

(i) $\int \sqrt[5]{x^3} + \frac{t}{x^3} - \frac{t^2}{\sqrt{x}} \, dx$

[3 marks]

(ii) $\int_{-2}^2 \frac{1}{x^2} + 2x - \frac{x^3}{5} \, dx$

[3 marks]

(iii) $\int \frac{4x}{\sqrt{2x^2+1}} dx$

[5 marks]

End of Page.

Course: Essential Mathematics

Code: PEM0044

Summary of Formulas

1. Basic Rules of Differentiation

$$\text{i) } f'(x) = 0$$

$$\text{ii) } f'(x) = nx^{n-1}$$

$$\text{iii) } cf(x) = cf'(x)$$

$$\text{iv) } f(x) \pm g(x) = f'(x) \pm g'(x)$$

$$\text{v) } f'(x) = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$\text{vi) } f'(x) = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{[v]^2}$$

$$\text{vii) Chain rule: } \frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

$$\text{viii) General power rule: Derive } [f(x)]^n = n[f(x)]^{n-1} f'(x)$$

2. Basic Rules of Integration

$$\text{i) } \int k \, du = ku + C$$

$$\text{ii) } \int u^n \, du = \frac{u^{n+1}}{n+1} + C$$

$$\text{iii) } \int kf(u) \, du = k \int f(u) \, du$$

$$\text{iv) } \int [f(u) \pm g(u)] \, du = \int f(u) \, du + \int g(u) \, du$$